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10/798,967	03/12/2004	Kwong-Kit Choi	ARL 03-56	7734

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EXAMINER	
ZETTL, MARY E	
ART UNIT	**PAPER NUMBER**
2884	

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/798,967	CHOI, KWONG-KIT	
	Examiner	Art Unit	
	Mary Zettl	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12 March 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 4, 7, and 9-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Gunapala et al. (US 6,211,529 B1).

Regarding claim 4, Gunapala et al. teach a multi-wavelength detector system used in cameras, comprising a focal plane array (col. 5, lines 33-37); a voltage source (Figure 5, item 90; col. 8, lines 8-10) adapted to supply a bias voltage (col. 8 lines 9-10); first-wavelength detectors coupled to the voltage source, the first-wavelength detectors having non-parallel sides (Figure 5, item 11), the first-wavelength detectors being adapted to detect energy at a first range of wavelengths when the voltage source supplies the first bias voltage, the first-wavelength detectors further being adapted to generate photocurrents proportional to the detected energy at the first range of wavelengths (col. 12, lines 57-60) and second-wavelength detectors coupled to the voltage source, the second-wavelength detectors having non-parallel sides (Figure 5, item 11), the second-wavelength detectors being adapted to detect energy at a first range of wavelengths when the voltage source supplies the first bias voltage, the first-wavelength detectors further being adapted to generate photocurrents proportional to

the detected energy at the second range of wavelengths (col. 12, lines 60-63); and CMOS circuitry (col. 5, lines 35; Figure 8, item 810) being configured to generate two-dimensional infrared images by detecting and processing the photocurrent (col. 10, lines 18-20).

Regarding claims 7, 9, and 11 Gunapala et al. (US 6,211,529 B1) teach a detector comprising a top electrical contact layer (Figure 5, item 510; col. 8, line 4) and bottom electrical contact layer (Figure 5, item 506; col. 8, line 2); a substantially transparent substrate being configured to admit light (GaAs substrate; col. 8, line 2; Figure 5, item 504); a voltage source (Figure 5, item 90; col. 8, lines 8-10) electrically coupled to the first contact and the second contact, the voltage source being adapted to supply a first bias voltage between the first contact and the second contact, the voltage source further being adapted to supply a second bias voltage between the first contact and the second contact; a top coupled to the first contact (Figure 5); a bottom coupled to the substantially-transparent substrate, the bottom adapted to receive the light admitted through the substantially-transparent substrate (Figure 5); sides extending from the top to the bottom, each side being substantially non-perpendicular to the bottom and non-perpendicular to an opposing side, each side being adapted to redirect the admitted light (Figure 5). Gunapala et al. further describe fabricating additional QWIP out of different materials (col. 12, lines 41-51) so that when the corresponding biased voltage is supplied the radiation wavelength is resonant and is absorbed by the quantum well (col. 7, lines 46-47), with each of these QWIP elements being a superlattice of quantum wells (Figure 3B).

Regarding claim 10, Gunapala et al. (US 6,211,529 B1) disclose the limitations set forth in claim 7, and further disclose a first-wavelength QWIP element (Figure 3B) and a second-wavelength QWIP (Figure 3B, item 308), with different absorptive properties (col. 12, lines 52-67) wherein the first quantum well and the second quantum well are separated by a blocking barrier (Figure 3B, item 310).

Regarding claims 15 and 16, Gunapala et al. disclose voltage-tunable multicolor (Abstract) infrared (IR) detector comprising: a substantially-transparent substrate (GaAs substrate; col. 8, line 2; Figure 5, item 504); adapted to admit light; sides extending from the top to the bottom (Figure 5), each side being substantially non-perpendicular to the bottom and non-parallel to the opposing side, each side being adapted to redirect admitted light and a superlattice first-wavelength QWIP element (Figure 3B) and a superlattice second-wavelength QWIP (Figure 3B, item 308), with different absorptive properties (col. 12, lines 52-67).

2. Claims 12-14, 17, 18, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Johnson et al. (US 2002/0125472 A1).

Regarding claims 12-14, Johnson et al. teach a voltage-tunable (page 2; paragraph 16) multispectral (Abstract) infrared (IR) detector comprising: a substantially-transparent substrate (GaSb substrate; Figure 3, item 311; page 4; paragraph 37) adapted to admit light; sides extending from the top to the bottom (Figure 3), each side being substantially non-perpendicular to the bottom and non-parallel to the opposing side, each side being adapted to redirect admitted light.

Regarding claim 17, Johnson et al. teach a light detection method comprising the steps of receiving incident radiation (page 2, paragraph 16); reflecting the incident radiation at an angled surface (paragraph 16; Figure 3); and directing the reflected radiation through a voltage-tunable (page 2; paragraph 16) multispectral (Abstract) infrared (IR) detector.

Regarding claims 18 and 20, Johnson et al. teach the limitations set forth in claim 17 and further teach (page 2; paragraphs 15 and 16) supplying a first bias voltage to the voltage-tunable multi-color IR detector element to detect energy at a first range of wavelengths (shorter wavelength; Figure 2B, item 201; page 2, paragraph 14) and supplying a second bias voltage to the voltage-tunable multi-color IR detector element to detect energy at a second range of wavelengths (longer wavelength; Figure 2B, item 202; page 2, paragraph 14).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gunapala et al. (US 6,211,529 B1) in view of Majumdar et al. *Electron transfer in voltage tunable two-color infrared photodetectors.*

Regarding claim 1, Gunapala et al. teach a teach a multi-wavelength detector system used in cameras, comprising a focal plane array (col. 5, lines 33-37); a voltage source (Figure 5, item 90; col. 8, lines 8-10) adapted to supply a bias voltage (col. 8 lines 9-10); a top electrical contact layer (Figure 5, item 510; col. 8, line 4) and bottom electrical contact layer (Figure 5, item 506; col. 8, line 2); a substantially transparent substrate being configured to admit light (GaAs substrate; col. 8, line 2; Figure 5, item 504); a matrix of detectors, each detector comprising: a top surface coupled to the top contact (Figure 5); sides extending from the top to the bottom, each side being substantially non-perpendicular to the bottom and non-perpendicular to an opposing side, each side being adapted to redirect the admitted light (Figure 5); first-wavelength detectors coupled to the voltage source, the first-wavelength detectors having non-parallel sides (Figure 5, item 11), the first-wavelength detectors being adapted to detect energy at a first range of wavelengths when the voltage source supplies the first bias voltage, the first-wavelength detectors further being adapted to generate photocurrents proportional to the detected energy at the first range of wavelengths (col. 12, lines 57-60) and second-wavelength detectors coupled to the voltage source, the second-wavelength detectors having non-parallel sides (Figure 5, item 11), the second-wavelength detectors being adapted to detect energy at a first range of wavelengths when the voltage source supplies the first bias voltage, the first-wavelength detectors

further being adapted to generate photocurrents proportional to the detected energy at the second range of wavelengths (col. 12, lines 60-63). Gunapala et al. do not specify the first and the second bias voltages being positive and negative respectively. Majumdar et al. *Electron transfer in voltage tunable two-color infrared photodetectors*, teach two-color quantum-well infrared photodetectors (Abstract). Majumdar et al. further specifies CQWIP (Figure 1d). Majumdar et al. further teach a positive bias for detecting lower wavelengths and a negative bias for detecting higher wavelengths (page 4628, Responsivity section, paragraph 2). At the time the invention was made, it would be obvious to one of ordinary skill in the art that the first and second bias voltages could be positive and negative voltages respectively as described by Majumdar et al. and perform the same function of selecting certain wavelength bands, as the voltages described by Gunapala et al.

Regarding claim 2, Gunapala et al. in view of Majumdar et al. *Electron transfer in voltage tunable two-color infrared photodetectors* teach the limitations set forth in claim 1 and further teach a first-wavelength QWIP element (Figure 3B) and a second-wavelength QWIP (Figure 3B, item 308), with different absorptive properties (col. 12, lines 52-67) wherein the first quantum well and the second quantum well are separated by a blocking barrier (Figure 3B, item 310).

Regarding claim 3, Gunapala et al. in view of Majumdar et al. *Electron transfer in voltage tunable two-color infrared photodetectors* teach the limitations set forth in claim 1 and further teach each of these QWIP elements being a superlattice of quantum wells (Figure 3B).

4. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gunapala et al. (US 6,211,529 B1) in view of Mitra (US 20040108564 A1).

Regarding claims 5 and 6, Gunapala et al. teach the limitations set forth in claim 4, however do not disclose expressly a display adapted to display the first-wavelength and second-wavelength image concurrently. Mitra teaches a multi-spectral super-pixel photodetector for detecting four or more different bands of infrared radiation (Abstract) and further teaches the use of an external system for displaying wavelengths from multiple bands (page 6, paragraph 57). It would be obvious to one of ordinary skill in the art to modify the invention of Gunapala et al. such that the first and second wavelength images are displayed concurrently as suggested by Mitra so that a quicker means for visualizing and manipulating the signals is provided.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gunapala et al. (US 6,211,529 B1)

Regarding claim 8, Gunapala et al. teach the limitations set forth in claim 7, however do not disclose expressly metal contacts. It would be obvious to one of ordinarily skill in the art that in order to conduct electricity, the contacts must be made out of metal.

6. Claims 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson et al. (US 2002/0125472 A1) in view of Mitra (US 20040108564 A1).

Regarding claims 19 and 21, Johnson et al. teach the limitation set forth in claims 18 and 20. Johnson et al. further teach that the array of photodetectors can be used in a camera, however do not specify generating the images from energy detected at the first and second range of wavelengths. Mitra teaches a multi-spectral super-pixel photodetector for detecting four or more different bands of infrared radiation (Abstract) and further teaches the use of an external system for displaying wavelengths from multiple bands (page 6, paragraph 57). It would be obvious to one of ordinary skill in the art to modify the invention of Gunapala et al. such that the first and second wavelength images are displayed concurrently as suggested by Mitra so that a quicker means for visualizing and manipulating the signals is provided.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Zettl whose telephone number is (571) 272-6007. The examiner can normally be reached on M-F 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MZ

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